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Review

# Social mobilization on climate change and energy: An evaluation of research projects in British Columbia, Canada

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ABSTRACT

Substantial public engagement in and support for climate action is needed to prevent the worst impacts of climate change from occurring. Efforts to boost such engagement can be collectively referred to as "social mobilization" initiatives, which can take a number of forms, from government-led planning processes to neighbourhood-scale grassroots initiatives. Such programs hold significant promise in their ability to lower perceptual barriers about climate change and increase motivation for action through various forms of engagement, learning and hands-on involvement. However, evaluations of the necessary components for the success of such programs remain scarce. To address this gap, we evaluate eight research projects that focused on developing and/or evaluating novel social mobilization initiatives on energy and climate change mitigation in the province of British Columbia, Canada. We identify the components of successful social mobilization projects and explore transferable lessons to future initiatives or programs designed to engage and mobilize citizens on climate change. Our findings indicate that social mobilization on climate change can be effectively fostered via multiple pathways. However, several barriers and limitations to effective community engagement on climate change are also identified, along with implications for other regions and researchers attempting to scale up societal responses to climate change.

## 1. Introduction

Governments around the world are initiating various measures to respond to and prevent the worst impacts of climate change, from national strategies to municipal plans. Many of these programs have focused on effecting or supporting structural changes and incentives, from energy efficiency upgrades for building codes and transportation plans, to the establishment of carbon taxes and other financial mechanisms. While these are important components of any climate action plan, there is growing recognition that they alone will not be sufficient in effecting the broad, transformative changes in our societies that are required in order to avoid significant climate warming and meet aggressive greenhouse gas (GHG) emission reduction targets. Substantial public engagement in and support for climate action is also needed, including support for the necessary shifts in our daily habits and practices to achieve low-carbon resilient outcomes. Efforts to increase such forms of engagement are sometimes referred to as "social mobilization" initiatives [1], the focus of this paper. Social Mobilization, according to United Nations Children's Fund (UNICEF), is a "process that engages and motivates a wide range of partners and allies at national and local levels to *raise awareness of and demand for* a particular objective through face-to-face dialogue. Members of institutions, community networks, civic and religious groups and others *work in a coordinated way* to reach *specific groups* of people for *dialogue with planned messages*. In other words, *social mobilization seeks to facilitate change through a range of players engaged in interrelated and complementary efforts*".[1]

However, the effectiveness of social mobilization interventions on climate change in practice has not yet been extensively studied. As such, there is a considerable need to evaluate social mobilization approaches and tools to date in order to determine their effectiveness in addressing climate and energy issues, and to identify factors involved in their success. To help address this gap, we carried out a review of a number of social mobilization projects carried out in the Province of British Columbia (BC), Canada. The Province of BC has had provincial climate change policy since 2007, when it set

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[1] Authors' emphasis in italics.

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emission reduction targets of 33% below 2007 levels by 2020, and 80% below 2007 levels by 2050. These targets were later followed by the release of a complete Climate Action Plan in 2008, which was recently updated in 2016. Prior to the Paris Agreement, these targets represented some of the more ambitious targets adopted by provinces in Canada. However, Canada and some other provinces have since adopted a target of 30% below 2005 levels by 2030. The most populous province of Ontario has also set a target of reducing its emissions by 80% over 1990 levels by 2050.

What also made 2007 a key year for climate policy in BC was the establishment of the Pacific Institute for Climate Solutions (PICS), an institution charged with the task of developing and monitoring climate mitigation and adaptation solutions. Among the Institute's five original major research themes in the first round of funded research (2009–2014), a *Social Mobilization* stream was created to explore and foster public engagement in climate policies and/or response programs. In this paper, we review a selection of eight projects engaging communities on energy and/or climate change mitigation that were completed or evaluated under PICS' *Social Mobilization* research theme. The purpose is to explore their outcomes, strengths, and weaknesses, and identify transferable lessons for future initiatives designed to engage and mobilize citizens on climate change. Our findings emphasize that social mobilization on climate change can be fostered successfully at multiple levels, from catalyzing dialogue within communities, to improving awareness among individuals and achieving significant energy savings and carbon emission reductions at various scales. However, barriers do remain to effective community engagement on climate change, which several of these projects have begun to identify and address.

We begin our assessment in Section 2 with a review of key reasons for engaging the public on climate and energy actions, including key dimensions of social mobilization efforts that appear central to their success and provide an analytical framework for assessing these social mobilization process and outcomes. In Section 3, we further describe both the PICS program and the selection of cases that we review, and apply the framework to the evaluation of social mobilization efforts in terms of their methods and outcomes. In Section 4, we discuss the successes, failures and contributing factors across the eight cases, and in Section 5 present our conclusions and recommendations for future social mobilization efforts, both in BC and elsewhere.

## 2. Mobilizing the public on climate change

### 2.1. The challenge of climate change engagement

The need for social mobilization efforts stems from the challenge of engaging people with the pressing yet largely intangible issue of climate change. Research in climate change has pointed to a significant disconnect between what individuals know and value about climate change or sustainability, and what they actually do – what has been termed the 'value-action gap' [2,3]. This disconnect has persisted despite evidence that general awareness of climate change impacts and solutions has grown, leading some scholars to conclude the existence of a low degree of 'carbon capability' [4] or 'carbon consciousness' [5] among citizens (see also [6–8]). The low perceived salience of climate change to everyday life has also been known to foster feelings of apathy and/or the inability to make a difference, prompting many North American citizens to turn a blind eye to mobilization efforts [9–11]. Sheppard [8,1] has argued that the invisibility of carbon, as well as various climate change impacts, has exacerbated and sustained this gap. Furthermore, research in BC and elsewhere has found that while citizens may endorse broad climate change mitigation policies, they often resist their implementation via specific community and/or energy plans and policies that affect their own neighbourhoods [12,13].

### 2.2. Social mobilization as solution

Social mobilization projects attempt to address these challenges by using more engaging approaches that seek to lower perceptual barriers about climate change, and increase capacity and motivation for action through various forms of learning and hands-on involvement. Social mobilization has been defined as the "engagement and motivation of the public and multiple stakeholders to implement climate solutions, through social learning, social movements, behaviour change, community action, and policy change" [14]. The goal of such efforts is ultimately to foster a shift towards a low-carbon, more resilient society by:

a) Building public support for climate change policies and actions designed by governments to achieve GHG reduction targets and other climate or energy goals;
b) Building the capacity of citizens and communities to plan and carry out their own climate change adaptation and mitigation practices and projects; and
c) Engaging citizens in co-developing and helping to implement climate change solutions supported by non-governmental organizational or institutional initiatives [14].

As applied in this paper, social mobilization efforts seek to effect change via multiple avenues (both formal and informal) and scales, from increasing support for policies at national and local scales, to eliciting commitments to changing personal habits and practices within a family. As such, social mobilization efforts embrace but reach beyond traditional characterizations of both community engagement and social movements. Community engagement, as practiced by most local governments and many other organisations, takes many forms, including one-way governmental communications programs, and more interactive consultations or cultural activities; however, these tend to have somewhat limited objectives such as education of individuals and households through informative strategies [15], or early input to planning processes [16,17]. These represent key components of social mobilization, but the point of mobilization is practical collective action on addressing climate change as the end goal.

Social movements also overlap considerably with the concept of social mobilization, in that both can contain elements of political organization, networking, and collective or grassroots action ([18]; see also [19–21]). Various aspects of social movement theory apply to social mobilization in the context of climate change, particularly the necessity for some kind of organizational structures, access to resources and communication channels, and social processes for sharing understandings and new conceptions of their world [21]. However, social movements have classically been discussed within a narrower frame, whereby informal grassroots organizations respond to perceived grievances or issues in an oppositional and sometimes disruptive stance against an incumbent institutional body, as in campaigns against fracking [22] or windfarms [13]. While these are forms of social mobilization, we conceive social mobilization as not necessarily requiring heavy political lobbying or protests, or a strong role in governance and policy issues (e.g [23].). Instead, social mobilization can take more diverse forms, including government-funded NGO initiatives (such as Vancouver's Green Bloc Neighbourhoods program)[2]; voluntary community-led efforts on renewable energy and local food production (such as the Transition Town movement, see [24]); and various collaborations between citizens, stakeholders and small utilities in developing 'community renewables' [25]. Social mobilization may not be associated with a specific interest group, can address multiple outcomes, and may be as much about changing the participants themselves as changing some external

[2] http://greenbloc.lighterfootprint.ca/.

agency. Social mobilization on climate change therefore embraces a combination of top-down, bottom-up, and third party interventions [1], with a focus on tangible outcomes of climate change response for both mitigation and adaptation.

Social mobilization efforts rest on the assumption that citizens need to be meaningfully engaged in co-creating solutions in order for them to be effective [26–31]. As such, social mobilization projects often place principles of community engagement and social learning [32] at the centre of any efforts to build awareness, motivation, and capacity among communities and other socio-cultural groups. Research has found that engaging in collaborative activities can enable better dialogue, learning about multiple perspectives, and greater understanding, acceptance and trust among members [33]. Engaging social norms and dynamics furthermore harnesses the potential of positive reinforcement and peer pressure, in which group members may seek to emulate perceptions and behaviours of trusted or respected community members [9,34,35]. The use of experiential learning [36] has also been found to elicit emotional involvement that can establish a personal connection to climate change [37] which can be inspiring, motivating, and long-lasting.

The benefits of both public engagement broadly, and social mobilization specifically, also include the promotion of civic competency [23,38], in which citizens exercise their rights to influence the political processes that affect their lives, improving the quality of local decisions. Such participation is known to augment the legitimacy of policies by making their development more accessible and transparent, as well as representative of a diversity of values and interests (see e.g. [17]). Meaningful engagement can build trust between citizens and elected officials, thereby increasing the ability of policy-makers to make significant changes by increasing the likelihood of public acceptance of their decisions [39,40]. Ultimately, the goal of such projects is to mobilize action in such a way as to see tangible reductions in energy use, greenhouse gas emissions, and/or vulnerability to climate change impacts.

As context for this paper, British Columbia exhibits a similar range of illustrative examples of social mobilization on climate change and energy related issues that are reflective of social actions across North America and globally. These include more conventionally defined examples of social movements, both in favour of climate change action (such as campaigns to stop fossil fuel pipelines[3] and blockade coal-carrying trains), and in opposition to new renewable energy projects such as the BC Hydro Site C dam[4] and run-of-river projects by independent power producers. Social movements within urban communities have been less prominent, although there has been considerable local opposition to high-rise densification[5] and the installation of smart meters.[6] Examples of less oppositional social mobilization interventions on climate change include many municipal initiatives to inform and consult with citizens on sustainability policies (e.g. Vancouver's Greenest City Action Plan[7], third-party interventions for neighbourhood engagement such as the Green Bloc[8] process and Citizens Coolkit,[9] and bottom-up initiatives such as the Village Vancouver[10] transition program.

### 2.3. Making social mobilization happen

With the goals and benefits of social mobilization established, we can now turn to the key question at the heart of this article: how can a social mobilization effort be successfully realized? While a comprehensive review of social mobilization projects has not yet been undertaken, research in the social and cognitive dimensions of climate change offer several insights that can be used to help answer this question, identifying at least four core elements of effective social mobilization.

First, the actual instigator of social mobilization efforts varies widely by project. Projects are often initiated by an organized community group, as in political campaigns, grassroots initiatives, or educational programs, or through regulatory programs and incentives. However, actors involved often represent some combination of state and non-state actors [41]. Indeed, recent work has shown that without the coordination and/or funding provided by government-led (i.e. top-down) projects, the larger effects of such projects can remain limited or miss opportunities to expand or scale up [42]. The support or guidance offered by a member of the "third sector" (e.g. volunteer organizations, cooperatives, faith centres) can moreover help to address and mobilize populations with a range of different interests and motives for action [43].

Second, the scale at which the initiative is scoped can also play a role in its success. Communities themselves have been identified as fruitful scales for the design and implementation of climate action interventions, as they help to localize climate change and ground abstract ideas in specific places [8,15,44]. Communities are also the scale at which many relationships are formed, building trust between actors and presenting issues that are most engaging for its members ([7,45,46]; see also [47,48]). Sheppard [8] has argued that broader scale approaches that do not demonstrate sustained visibility of local actors moving on climate change fail to harness the potential of social norms in encouraging and reinforcing individuals to act on climate change.

The target groups of such efforts vary as well. Mobilization efforts are often targeted at those who are already engaged – what Maibach et al. [34] have described as "alarmed" or "concerned" populations (see also [49]). To achieve meaningful change at scale, efforts must go beyond those already aware and concerned to engage the "silent majority", the disinterested, or the "middle 60%" [34]. Given the particularly low perceived salience of climate change to these segments of the population, it is also important to emphasize the co-benefits of climate action, such as building social relationships, saving money, protecting health, and increasing local control [50]. This more generally speaks to the need to connect initiatives' goals directly to everyday needs, concerns, and values in order to allow participants to make tangible and meaningful connections to the issue [15,21,51].

Finally, there is a need for instigators to present information and ideas in such a way that future environmental losses and the risks of inaction are balanced with positive implications of action to avoid a sense of helplessness or numbing [9,52,53]. While both social movements and social mobilization typically require shared meanings and emotional engagement among participants, compelling interactive techniques used in social mobilization (e.g. visual and spatial media) have also proven effective in attracting community participants, engaging them in activities, changing attitudes, and increasing motivation for further involvement [1]. Engagement processes are increasingly advised to make use of vivid and concrete imagery that immerse participants in the experience and help to render concepts more tangible [54,55]. For example, climate change visioning processes to explore local future scenarios have been carried out in several BC communities, and have shown such approaches to be effective in rapidly building awareness and increasing self-reported support for adaptation and mitigation policies [56–58]. While the longitudinal effects of social interventions are rarely researched or documented [16], Cornish [59] and

[3] https://raventrust.com/stop-the-kinder-morgan-pipeline-project/; https://secure.canadians.org/ea-action/action?ea.client.id=1899&ea.campaign.id=80622.

[4] https://www.sitecproject.com/.

[5] https://www.civicinfo.bc.ca/practices_innovations/eco_density_initiative–vancouver–2009.pdf.

[6] http://theprovince.com/news/b-c-hydro-must-remove-more-than-88000-smart-meters.

[7] http://vancouver.ca/green-vancouver/greenest-city-action-plan.aspx.

[8] https://www.evergreen.ca/our-projects/green-bloc-neighbourhoods/.

[9] http://calp.forestry.ubc.ca/home/urban-forestry-toolkit/.

[10] http://www.villagevancouver.ca/.

**Table 1**
Summary table of social mobilization research projects in BC and their participants.
Adapted from Table 3.1, [1], Pacific Institute for Climate Solutions.

| Categories | Projects | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Good Life Green Life | Do it in the Dark | Meeting the Climate Change Challenge[a] | | Greenest City Conversations[a] | | Revelstoke Urban Form Workshops | Solar Colwood |
| | | | Eagle Island Retrofits | T'Sou-ke Solar Community | Vancouver Transportation Facebook | Energy Workshops | | |
| Lead organization | Academic | Academic | Community | Community | Government | Government | Government | Government |
| Associated with a formal planning process | | | | | ✓ | ✓ | ✓ | ✓ |
| Actors involved Community | | | ✓ | ✓ | | | | |
| Third party | ✓ | ✓ | | | ✓ | ✓ | ✓ | |
| Government | | | | | ✓ | ✓ | ✓ | ✓ |
| Number of people engaged (approx.) | Total engaged: 3000 to date; Research conducted on 6 households | 646 university students | 26 house-holds | 96 house-holds | 750 Vancouver residents; 537 registered on Facebook | 70 Vancouver residents | 44 Revelstoke residents | 1600 Colwood homeowners |
| Geographic scale | Metro Vancouver | 6 university campuses | Small neighbour-hood | Small neighbour-hood | City of Vancouver | 30 block-scale neighbourhoods | 3-6 block-scale neighbourhoods | Municipality of Colwood |
| Tools/media used | Video, website, social media, workshops & film screenings | Video, social media (Facebook), energy dashboard | Thermal imaging, email | Unknown | Social media (Facebook) | Graphics, mapping, 3D visualization, collage/ game | Graphics, mapping, 3D visualization, touch-table, survey | General public information (e.g. website, emails, etc.) |

[a] Indicates an overarching umbrella program, of which the projects evaluated here formed a part.

Schroth et al. [60] found that iconic landscape visualizations of future local climate change projections were clearly remembered years later by municipal staff, and credited with bolstering the confidence of local government staff in acting on climate change. Several projects are also making increasing use of interactive online and/or digital technologies (e.g. online games, touchscreen tabletops, Facebook/Twitter; see [12,61]). Such efforts are demonstrating the power of more immersive, visual, and sharable media, tools, and procedures that represent more emotional means of engagement in creating lasting impacts and connecting the dots between abstract concepts and everyday life.

## 3. Evaluating social mobilization efforts in BC

### 3.1. Project evaluation framework

The insights from the body of research reviewed above can be distilled into a basic evaluative framework for social mobilization efforts, using the core elements of successful programs. As such, the success of each of the eight research projects reviewed in this paper has been explored in relation to the following key areas of inquiry related to process:

- Actors
  - What type of actor led the initiative?
  - Were partnerships between different kinds of actors established?
  - Were resources or support provided by a government actor?
- Scale
  - Was the scale of the effort broad in nature, or targeted at a smaller group or community?
  - Were participants able to interact/network with one another?
- Audience
  - Did efforts engage populations beyond the 'usual suspects'?
  - Were participants' personal or shared values used as a basis for engagement?
- Medium/tools/procedures
  - Were any engaging methods of interaction or information presentation used (e.g. social media, visualizations)?
  - Was social learning encouraged?
  - Did the participants determine the experience to be rewarding or engaging?

In addition to the more process-based criteria noted above, projects were also evaluated for their outcomes, including one or more of the following:

- Awareness & Capacity
  - Is there evidence that knowledge, awareness and/or concern has increased among participants?
  - Has the overall capacity of participants to act been improved?
- Action
  - Is evidence of collective action discernable? E.g. changes in habitual activities, facilities built, technologies installed, etc.
  - Were any new policies implemented as a result of the effort?
  - Were any co-benefits realized?
- Measurable Results
  - Were there measurable reductions in energy use or emissions?
  - Was vulnerability to climate change impacts reduced?

It should be noted, however, that the applicability of the outcome-based criteria noted above was contingent on the goals and outcomes of each project. As such, not every criterion was necessarily applied to all projects.

### 3.2. Project selection and methods

The projects selected for evaluation in this article include most but not all of the full portfolio of research projects accepted under the '*Social Mobilization*' category of the Pacific Institute for Climate Solutions' first round of research funding (2009–2014). These represented interventions using innovative tools, technologies and/or processes to engage and mobilize the public around issues related to climate change and clean energy, with a focus on communities, the public planning interface and digital/visual media. It should be noted that the selected research projects had considerable latitude in interpreting their own definition and scope of social mobilization activities. As such, these projects represent a broad array of mixed-methods research approaches, enabling comparative analysis applied to real community contexts, and addressing issues of energy demand, energy supply, transportation, urban form, and sustainable behaviours.

Table 1 presents a summary of the eight projects and the general characteristics and reach of the interventions, including:

- Leading actor (organization) instigating the intervention;
- Types of principal actors involved in the intervention;
- Any association with a formal planning process;
- Geographic scale;
- Number of participants involved; and
- The principal tools and methods that were used.

Each research project targeted a social mobilization intervention and carried out some evaluation of its impact. In five of the eight projects, a PICS-funded research team was a key third-party instigator of the intervention, and worked in collaboration with either a non-governmental organization or the lead government organization. On the other three projects (Eagle Island Retrofits, T'Souke Solar Community, and Solar Colwood), the interventions had been independently instigated earlier and were evaluated by a PICS research team.

As shown in Table 1, four of the projects were not associated with a formal community planning process, and were initiated by non-government parties. Of these, two represent third-party interventions into subject groups, while the other two represent post-hoc assessments by researchers to understand grassroots programs initiated by small local communities. The four projects tied to government planning addressed local community energy issues of built form (n = 2), energy supply (n = 1) and transportation (n = 1). Finally, half of the projects specifically attempted to directly catalyze actual reductions in emissions or energy use, while the other four projects were focused on exploring and/or generating interest in sustainability or local planning policy. Overall, an estimated total of approximately 9430 individuals in BC were contacted through these projects, with an estimated total of approximately 3000 actually engaged in PICS-funded research evaluations.

It should also be noted that the authors of this paper remained largely independent of the projects themselves, with the following caveats:

- Sheppard chaired the original Social Mobilization theme committee, which created the research brief and selected the successful teams, and served in an advisory role on two projects (Greenest City Energy Workshops and MC3 Eagle Island Retrofits)
- Cote coordinated the original Social Mobilization theme committee
- Salter co-designed the workshop process and evaluated results from the Energy Workshops project, and was also involved in some analysis of the Revelstoke Urban Form workshops.

All projects carried out some form of evaluation of the actual social mobilization intervention, which in most cases included a formal quantitative and/or qualitative analysis of participant responses. Project materials that were reviewed for this paper included both preliminary materials, such as project proposals and interim reports, as

**Table 2**
Project summaries and materials reviewed.

| Project | Project goals & methods | Materials reviewed |
|---|---|---|
| **Good Life, Green Life**<br>*A day in my carbon neutral life: Imagining transformative change, overcoming barriers to action* | • To conduct an ethnographic exploration of what motivates citizens to move from concern to action on climate change<br>• Filmed in-depth interviews with participants were transformed into a full-length film, which was then used as an engagement tool via a film launch, an associated online forum for discussion and support, and social media outreach | • Proposal, interim and final project reports (Daub 2010–2015)<br>• Presentation on project results [62] |
| **Do it in the Dark**<br>*From communities of interest to communities of practice: Digital media as catalysts for climate action campaigns* | • To create a competition between university dormitories to lower energy use relative to each building's baseline<br>• Use of online Building Energy Dashboard to track building energy consumption, "My Everyday Earth" Facebook application data, participant reflections and vlogs, and survey data | • Proposal, interim and final project reports (Senbel 2010–2014)<br>• Published article [12] |
| *Meeting the Climate Change Challenge (MC3)* *<br>**T'Sou-Ke First Nation Solar Community**<br>**Eagle Island Retrofits** | • To identify and investigate innovative municipal / local approaches to provincial climate policy and document best practices through detailed case studies<br>• To spur cross-scale and peer-to-peer knowledge mobilization between communities using learning exchanges, E-dialogues and live chats<br>• Explored the social mobilization outcomes of two smaller-scale projects | • MC3 research agenda [63]<br>• Case study report [64]<br>• Summary report (MC3 2014)<br>• Published article (Newell and Dale 2015)<br>• Project webpage (T'SEG 2014)<br>• Case study report [65] |
| *Greenest City Conversations*[a]<br>**Transportation Facebook app**<br>**Energy workshops** | • To facilitate a wide public discussion, and solicit and analyze public attitudes and opinions on, and support for, a variety of sustainability and climate change policies.<br>• To provide a comprehensive evaluation of the content and impacts of different modes of public engagement, including mobile apps, table-top games, performing art, social media, neighbourhood workshop, and a multi-scenario interface (MetroQuest) | • Published article [66]<br>• Unpublished thesis [67]<br>• Final report (O'Shea 2014) |
| **Revelstoke Urban Form Workshops**<br>*Measured visualizations as catalysts for mobilization: A prototype for public engagement in municipal planning for climate change* | • To evaluate the impact of clear, understandable, credible 2D and 3D visualizations on citizens' acceptance of smart growth design strategies aimed at reducing energy and emissions<br>• Use of a multi-touch table interface by participants to collaboratively develop a design scenario for one of two proposed neighbourhood sites; pre- and post- surveys | • Proposal, interim and final reports (Kellet 2010–2014)<br>• Published article [68] |
| **Solar Colwood**<br>*Understanding the public uptake and acceptance of a municipal green energy incentive program* | • Evaluation of a municipal engagement program designed to foster the uptake of solar hot water systems via the use of financial incentives | • Proposal interim and final reports (Ling 2010-2012)<br>• Research report, [69] |

[a] Indicates an overarching umbrella program, of which the projects evaluated here formed a part.

**Table 3**
Summary comparison of project evaluation results.
Adapted from Table 3.3, [1], Pacific Institute for Climate Solutions. (Actual GHG reductions have not been quantified by pre-post analysis of utility records, but are based on estimates provided by members of Cool Neighbourhoods program).

| PROCESS ACHIEVEMENTS AND OUTCOMES | | Good Life Green Life | Do it in the Dark | Eagle Island Retrofit | T'Sou-ke Solar Community | Transport Facebook | Energy Workshops | Revelstoke Urban Form Workshop | Solar Colwood |
|---|---|---|---|---|---|---|---|---|---|
| PROCEDURAL CHARACTERISTICS | Led by a community | | | ✓ | ✓ | | | | |
| | Collaboration between project partners | | ✓ | ✓ | ✓ | | | | ✓ |
| | Government support provided | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Targeted small community | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| | Sustained interaction between participants | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Use of fun social activities | ✓ | ✓ | ✓ | ? | | ✓ | ✓ | |
| | Engaged beyond "usual suspects" | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Engaged personal or spiritual values | ✓ | | ✓ | ✓ | | ✓ | | |
| | Positive participant experience | ✓ | ✓ | ✓ | ? | ✓ | ✓ | ✓ | ? |
| | Use of social media | ✓ | ✓ | ✓ | ? | ✓ | | | ? |
| | Use of visual media | ✓ | ✓ | ✓ | ? | | ✓ | ✓ | |
| | Use of social learning | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| | Availability of financial incentives | | | ✓ | ✓ | | | | ✓ |
| AWARENESS & CAPACITY | Increase in support for climate policy | ? | ? | ? | ? | ✓ | ? | | ? |
| | Increase in community capacity to act | | | ✓✓ | ✓✓ | | ✓ | ✓ | ? |
| | Increase in motivation or concern | ✓ | ✓✓ | ✓✓ | ✓ | ? | ? | ? | ? |
| | Increase in awareness/understanding | ✓ | ✓✓ | ✓✓ | ✓ | ? | ✓✓ | ✓ | ✓ |
| | Increase in community dialogue | ✓ | ✓✓ | ✓✓ | ✓✓ | ✓✓ | ✓ | ✓✓ | ✓ |
| ACTION | Change in behaviour observed | ✓ | ✓✓ | ✓✓ | ✓✓ | | | | |
| | Physical actions taken (e.g. facility constructed or modified) | ? | | ✓✓ | ✓✓ | | | | ✓ |
| | New policies adopted | | | | ✓ | ? | ? | | |
| | Co-benefits realized | ✓✓ | ✓✓ | ✓✓ | ✓✓ | | | | ✓✓ |
| RESULTS | Actual GHG reductions/energy saving | | ✓✓ | ✓✓[12] | ✓✓ | | | | ✓ |
| | Reduced vulnerability to climate impacts | | | ✓ | ✓ | | | | |

**Key:**

| | |
|---|---|
| | Intended outcome |
| ✓ | Affirmative/Positive result indicated |
| ✓✓ | Strong positive result indicated |
| ? | Unknown |

well as published materials such as final reports, journal articles and theses/dissertations (Table 2).[11] Where necessary in a few cases, informal interviews were also conducted with key members of relevant project teams for clarification and verification of each project's key outcomes after project completion. For further discussion of limitations in this review, see Section 4 below.

## 4. Social mobilization in BC: successes and challenges

### 4.1. Summary of process achievements

In reviewing the eight cases, several common characteristics emerged as important factors in project success or failure. A full comparison across projects is summarized in Table 3, which identifies:

- Key enabling procedural characteristics of the process, related to instigating actors, scale of community, target participants and media/tools used
- Key outcomes in terms of participant awareness and capacity, actions taken, and measurable results intensive carbon emissions or energy savings and reduce vulnerability to climate change.

#### 4.1.1. Actors

Success among the projects surveyed was most evident in those that were carried out via partnerships with different types of actors. The *Do It in the Dark* project offers an example here, where joint efforts between researchers, a student NGO, and audio-visual experts was instrumental in creating the online materials needed to foster friendly competitions between university residences to lower the total energy use. Such partnerships were also found in the *Eagle Island* project, in which a small community organized provision of thermal images of 26 homes to identify areas of heat loss through the building envelope. In this case, collaborations between city staff, firemen, an energy expert, volunteer college students, and local businesses helped to reduce costs of home retrofits. Support of the Eagle Island project by the District of West Vancouver was also a crucial enabling factor, providing technical guidance, staff time, encouragement from city councillors, and other resources. Bringing in members of the Fire Department to conduct the thermal imaging was another key factor, both for the visibility of the results as well as the inherent trust many participants had in firefighters themselves [64].

The skillful planning of social events and sustained campaigns or activities by a community champion or team of third-party interveners

[11] All research teams were invited to review a draft synthesis document containing a summary of findings after completion of the projects, in order to verify accuracy in describing methods and results. Minor comments and revisions were received from three teams.

and community organizers was also found to contribute to project success. In projects associated with a formal planning process, local governments provided both financial support, as well as a structured platform of engagement and participatory decision-support that helped to enable citizen education and reinforce citizen action across a broader area. However, among the cases that involved government support, financial incentives did not appear to be a pre-requisite for stimulating public interest or engagement. Where they were used, they appeared to play a supporting rather than lead role, relative to other supporting or constraining factors such as public knowledge and peer pressure/co-operation (personal communication, Tara Stafford, August 15, 2012).

#### 4.1.2. Scale

In several projects, the close spatial proximity and locational identity of project participants (*Eagle Island*, *T'Sou-ke* and *Do it in the Dark*) certainly contributed to the intensity of social activity and neighbour-to neighbour interactions. *Eagle Island*'s success in particular was partly attributed to its observability, which made local action visible to others through community get-togethers and collectively organized, socially rewarding work teams. The *T'Sou-ke Solar Community* is another example, in which a small First Nations community was able to engage all 96 households in realizing the community's vison of installing a number of solar panels for electricity and hot water. The *Do It in the Dark* campaign similarly targeted a specific and geographically constrained community – the inhabitants of university dormitories, although the competition extended over several university campuses hundreds of miles apart. Social media therefore appears to offer the chance to combine these localized 'communities of place' with extended 'communities of interest' (see [13]).

#### 4.1.3. Audience

Seven of the eight projects were found to successfully reach beyond the 'usual suspects' to involve sections of the public not normally engaged on matters of climate and/or energy, with evidence that new dialogues had been stimulated among direct participants. A strong example is presented in the *Good Life, Green Life* project, where the production of a full-length film created opportunities for engagement with climate change for individuals who did not consider themselves to be "environmentalists" or "activists" [62]. Several projects demonstrated the benefit of providing multiple or different types of channels for engaging people with different learning styles within a single project. For example, the *Do it in the Dark* research team found that engaging youth in a variety of competitive activities with their peers was an effective way of helping individuals from diverse backgrounds achieve shifts in energy saving behaviours. As one participant noted, "*completing simple, everyday tasks made the competition more meaningful and easy to participate in, as well as formed habits I can continue with in the future*" [12]. Energy-saving activities involving other people were the most popular and attracted the participation of 97% of project participants at one of the participating residences. In comparison, the *Solar Colwood* initiative failed to attract a wide representation in their attempts to foster the uptake of solar hot water systems via the use of financial incentives. A post-hoc evaluation indicated that the city struggled to reach the 'average' community member and did not develop collective action amongst neighbours, though it was able to engage a small group of people with predisposed interest in climate and energy issues.

Projects that used intensive social media achieved particularly high levels of involvement. The *Good Life, Green Life* project, for example, aimed to move citizens from concern to action on climate change via the use of film and online media. The project succeeded in building modest Facebook and Twitter communities (2300 + total followers) via interactive conversations and linking the film's themes to current events. In the *Vancouver Transportation Facebook app* project, researchers found that new demographic groups (e.g. younger, more media savvy people) were engaged in efforts to shape the City's transportation strategy, especially when compared to more conventional municipal engagement strategies such as town hall meetings [70]. Such findings were attributed by project evaluators to the relative youth and online savvy of certain stakeholder groups (e.g. students and cyclists), which tended to drown out other types of transportation users [67].

#### 4.1.4. Media and tools

The use of digital media (Facebook, YouTube and email) in the *Do it in the Dark* campaign increased participation by creating social networks online within communities that might otherwise have been difficult to engage by other channels. Social media often played the role of assisting actions that took place offline, as many used social media to learn of place-based activities and events. Students found the competition exercises to be fun, and enjoyed the social activities around the actual energy saving actions. The social media (with which many students were already familiar) proved more effective than the use of an "energy dashboard", in terms of its use and influence on behaviour. In the *Eagle Island* process, visual media from thermal imaging of heat loss from individual homes proved to be an effective means of motivating action [71].

Among digital and online media, Facebook apps in particular were found to be effective, since the simple and well-known interface was easy to use [67]. It was found to offer an open-ended mode of discourse, allowing participants to integrate various styles of expression, personal experiences, and forms of reasoning without being forced to reach consensus [66]. In the *Do It in the Dark* campaign, the channel was also found to be flexible enough to allow ongoing customization by intervenors [12]. A key trade-off of online deliberation that was noted, however, was that unlike face-to-face workshops that typically last several hours, online processes could be very brief. This was found to impact the depth of participant reflection, listening, and learning [67]. In the *Do it in the Dark* campaign, much of the usage was primarily to coordinate with friends, rather than contribute to an online dialogue [12].

Games, both manual, digital, and social were also found to help to engage and improve learning, as well as develop social relationships with peers. In *Do it in the Dark*, competitive elements in social gameplay were shown to be a major motivating factor in participation. Touchtables also enjoyed popularity and immediate appeal with participants in the *Revelstoke Urban Form Workshops*, in which project teams evaluated the impact of 2D and 3D visualizations on citizens' acceptance of planning strategies aimed at reducing energy and emissions [72]. While 3D overview perspectives on urban design workshops were found to be effective, they were not ranked as highly in comparison to other means of engagement, and were noted as less portable and simple to use than other visualization methods/interfaces.

The *Greenest City Energy Workshops* and *Revelstoke Urban Form* projects furthermore provided evidence of the effectiveness of workshops and their associated media tools. In both cases, these workshops provided innovative interactive exercises which were important for learning and providing a stimulating experience, either through touchtables or a scenario board game. In the *Greenest City Energy Workshops*, interactive exercises using a simple neighbourhood map, markers, and cards with values of associated GHG reduction strategies, were the highest ranked component of workshops designed to solicit and analyze public attitudes and support for sustainability and climate change policies [73]. The involvement of a facilitator and/or project coordinator, alongside a well-crafted, highly visual explanatory slide presentation, were also found to be important in providing structure and key messages before interactive sessions [73]. These collaborative activities were found to enable better dialogue, learning about multiple perspectives, emergent themes, and greater understanding, acceptance and trust-building amongst groups of people (see also [33]).

Both energy workshop studies further demonstrated the key role that alternative scenarios can play in meaningfully framing future projections to lay-people. The *Greenest City Energy Workshops* used a generic digital neighbourhood (or "sandbox") as a safe place to play,

which created a familiar but unspecific environment; this in turn enabled broad place-based learning without resistance from threatened homeowners. In comparison to these more engaging collaborative methods, the *Solar Colwood* project's adoption of a top-down, information-based strategy achieved limited participation and citizen uptake. While offering some financial incentives for installation of solar panels, the project did not build relationships with existing social networks and made little information available to support residents' decisions on energy options, forcing participants to do extensive searching for information on their own [69].

### 4.2. Summary of outcomes

#### 4.2.1. Increased knowledge, awareness and capacity

All projects were found to increase community dialogue and all but one provided evidence of success in increasing their participants' knowledge and awareness of climate change issues. For example, all nine of the core participants in the *Good life, Green Life* project indicated an improved awareness and articulation of the potential threats of inaction on climate change following a guided visioning process, in which each participant identified the importance of their own engagement in climate solutions. The future visioning exercise was found to be a key tool in helping participants move from uncertain or fuzzy pictures of what a low-carbon society might look like, to articulate a more concrete and detailed vision.

Participants of both activities under the *Greenest City Conversations* project (*Vancouver Transportation Facebook* and *Energy Workshops*) also reported that their perspectives on transportation issues (and transit policy in particular) and energy, respectively, had been expanded. Self-reported knowledge before and after the engagement processes moved from an overall mean score of 2.8/4 to 3.5/4, indicating significant improvements and the general effectiveness of the process.

Half of the projects demonstrated evidence of improved citizen motivation to take action on climate change or energy issues, half indicated increased capacity to act, and the two community-led projects demonstrated both. Viewers of the *Good Life, Green Life* film who reported an increase in agency said that the film challenged stereotypes of environmentalists as misanthropic, dogmatic, or angry, and for some countered feelings of isolation and powerlessness by showing real-life examples of people who are engaged in alternative ways of thinking and living. In the *Eagle Island* case, only 5 of the 31 households were not motivated to join the project, for reasons that included climate change denial but also the newness of their homes and/or the fact that retrofits had already been undertaken. However, only one project (*Vancouver Transportation Facebook)* found clear evidence of increased support for green policies such as expansion of bike lanes.

#### 4.2.2. Actions and emissions reductions

A review of the eight cases reveals a number of tangible positive outcomes that were achieved. Among the four projects that took place outside a formal planning process and involved citizen-led or NGO-assisted processes, three demonstrated substantive action and associated carbon emission reductions and/or energy savings. The *Do it in the Dark* and *Eagle Island* projects were particularly successful in mobilizing collective behaviour change towards energy conservation. Student residents of one particular dormitory (Totem Park, UBC) quickly reduced their average daily electricity use by 16% (455 kWh) during the approximately 3 week Facebook-based competition [12]. Consumption levels rose following the competition, but remained approximately 7% (188 kWh) below the established baseline the following term. In comparing this baseline to the six-month period during and after the competition, researchers found that the average daily energy use decreased by 8.4% (233 kWh).

Similarly, the *Eagle Island* community successfully retrofitted 84% of its 31 neighbourhood homes, catalyzed in part through using thermal imaging technologies coupled with community-based social events planning. The community has since explored additional means of reducing greenhouse gas emissions: since the community is only reachable by boat, community members have begun to acquire electric motors for their barges and to install electric charging stations. In 2012, the Eagle Island organizers estimated that the neighbourhood's average carbon footprint per household had dropped from 5 tonnes of $CO_2$/year to 1.7 tonnes.

Finally, the community-led *T'Sou-ke Solar Community* emerged from the receipt of a government grant for the installation of a solar energy system for electricity and heat in administrative buildings. The project eventually expanded out to install solar hot water on 40% of households with an estimated 30% reduction in residential electricity consumption. T'Sou-ke is now equipped with photovoltaic systems with a capacity of 75 kW of energy [65]. Of the 96 homes on the reserve, 38 have been equipped with solar hot water installations and all 96 reported significant energy savings as a result of their participation in the project [70]. Excess production is sold back to the provincial utility (BC Hydro), reducing operating costs further. In addition to these savings, the *T'Sou-ke Solar Community* program created a new skilled local work base by training and employing eleven community members in solar energy systems. The T'Sou-ke Nation has since developed a community garden project with a low-energy greenhouse, an initiative led by a community resident who now hosts regular cultural events.

Among the remaining projects, it should be noted that an absence of data or a different project intent have greatly limited the identification of or likelihood of emissions reductions. The *Good Life, Green Life* project's aim was to use documentary films of households concerned or alarmed about climate change as an educational and engagement tool, and unfortunately had not yet had time to document any actual changes at the time of review. Of the government-supported planning projects, the *Greenest City Conversations* projects, which used a range of social media, visual learning tools, and other engagement channels, and the *Revelstoke Urban Form* project, which focused on the use of in-person workshops and touch-tables, were all crafted to facilitate learning and input to policy and/or infrastructure plans over the long term; they therefore did not measure or expect to elicit emissions reductions in the short term.

#### 4.2.3. Co-benefits

Finally, many projects demonstrated that significant co-benefits were achievable, regardless of whether they were successful in their original intent or not. For example, energy audits and retrofits surpassed the energy savings of the planned solar hot water installations in Colwood, despite low uptake of actual solar technologies, and early development of electric vehicle charging stations has occurred [69]. Similar findings on spill-over effects were reported by participants in the *Good Life, Green Life* project. Participants of the *Eagle Island Retrofit* project reported an increased feeling of social cohesion and reliance on neighbours as a positive outcome of their participation, while the T'Sou-ke solar community expanded their original efforts to include community gardens, which went on to support both local food needs as well as weekly community events [65]. In the *Greenest City Conversations* and *Revelstoke Urban Forum* projects, participants were able to relate energy and planning concepts from the workshops to what they valued about a community. The *Transportation Facebook* project demonstrated to municipal planners that projects could receive more support where citizens perceived engagement to have a 'genuine' impact on policy [67].

### 4.3. Ongoing challenges

While the review above indicates several successful project processes and outcomes among the eight BC projects, there are a number of outcomes that were not achieved. The most notable example of where mobilization efforts failed to result in significant action or emissions reductions is the *Solar Colwood* project. In contrast to the third-party

and community-led projects, the government-led *Solar Colwood* initiative was not very successful in promoting the uptake of solar hot water technologies (installed in only 3.4% of targeted homes). Reasons offered for this failure include a strategy focused on a weak economic rationale with unreliable incentives, a lack of pre-preparation of the community, and lack of trust in the city [69]. The program also lacked the benefits of a smaller scale, 'micro-neighbourhood' focus, as exhibited in the two community-led projects of *Eagle Island* and *T'Sou-ke*, where it was relatively straightforward to involve most people in the community.

Secondly, variable impact on policy support, policy development or policy change can be discerned among the eight projects. For example, the *Revelstoke Urban Forum* project made use of popular and compelling interactive exercises and visual learning tools in the engagement process, but nevertheless had little influence on the public's acceptance of planning policies including a form-based code. This was attributed to strong and lingering concerns over the protection of community character in the face of substantially higher building densities. However, the process was successful in advancing understanding and acceptance of the underlying shifts towards sustainability – just not to the degree proposed by the city.

The *T'Sou-ke Solar Community* was perhaps the most effective in shifting policy. For example, all 96 houses have been subject to extensive energy saving programs, including Energy Saving Kits and Energy Conservation Assistance Program, though in circumstances differing from those in a typical municipality. The engagement of the Vancouver public via the *Transportation Facebook app* also informed the development of the city's draft Transportation Plan: 54% of users at the end of the process felt that their views were taken seriously by city conveners, compared to only 39% of local citizens engaged via previous face-to-face events [66]. Broader evidence of an effect on policy change was also documented across the wider Meeting the Climate Change Challenge (MC3) project, which found that collaboration and networking among municipal and provincial officials had a significant effect on the awareness and judgment of practitioners and elected officials [63]. However, based on available evidence, neither project directly affected the development of policy. It should also be noted that these studies were carried out fairly early in planning processes that were still ongoing at the time of our review. Such impacts on policy are also notoriously difficult to trace over time (see [59]).

Thirdly, few of the projects reviewed were able to scale up social action beyond the direct participants, or 'go viral' where social media was used as a method of engagement. The one exception is the *Eagle Island* initiative, which received considerable attention in both its home city of West Vancouver and beyond. The *Eagle Island* project lead was invited to accompany the Mayor of West Vancouver to present at the United Nations, and received a 'Global Green City' award for these and other West Vancouver initiatives. The grassroots organization *Cool North Shore* has worked with the project lead to expand the program to other communities. The spin-off *Cool Neighbourhoods* program has since established neighbourhood groups promoting thermal imaging and energy audits in approximately 15 other neighbourhoods on the North Shore, as well as other Metro Vancouver locations [64], although retrofit uptake rates are as yet unknown.

The review of the eight projects also highlighted a number of both social factors and institutional constraints that persist despite project efforts, which include:

- The unstable nature of incentive programs, which can act as a significant disincentive to residents and investment in the energy efficiency industry [69];
- Negative perceptions of density associated with lower per capita carbon emissions, with sometime limited understating of the range of density and urban form options [68];
- Lack of trust in city planners, and perceived lack of agency in being able to influence city planning outcomes [69];
- Disinterest in energy issues: local scale decision-making related to a community's stated goals to reduce energy and emissions could directly impact individuals' day-to-day lives, but making that connection is challenging [74];
- Shortage of champions or NGOs ready to organize bottom-up or third-party campaigns;
- Low levels of knowledge and understanding among citizens and in some cases even practitioners on energy concepts, relationships, and sources in local communities [73].

### 4.4. Limitations to the scope and methods of this review

While this paper is focused on the key elements of social mobilization efforts, we recognize that it is not enough to only motivate or engage people, since there are very real material constraints and entrenched institutional or socio-economic pathways that guide what we do and how we do it. Efforts to simply shift perceptions or 'behaviours' will therefore be limited in their success unless they consider the wider social and material contexts that shape our daily practices (see [75]), as well as any technological limitations that may hamper efforts to drive emissions reductions. Larger-scale changes in infrastructure, politics and other broad processes are also important to fostering transformative change and enabling shifts in practice (e.g. using transit) in conjunction with more directed social mobilization efforts.

The scope of the PICS projects reviewed is limited to mostly community-focused mobilization initiatives, and does not address other key sectors such as business and formal education institutions. It also does not attempt to evaluate other forms of social mobilization including protest campaigns and ongoing routine NGO activities related to climate change. Interpretation of results in this paper cannot necessarily be extrapolated to other forms of social mobilization. There are also significant cultural, political and geographic dimensions of the BC context that should caution application of these findings in other contexts (see below).

We also acknowledge the methodological limitations in the evaluation process enabled by the PICS research program. These notably include the open research proposal process used in the PICS projects, which made comparisons of projects difficult; and the unavoidable reliance in several projects on self-reported information from social mobilization participants. In five of the eight projects, the results that are being reviewed here have been reported by the research actors and intervenors themselves, raising the question of inherent bias towards successful project outcomes. However, three of these have been supported by peer-reviewed publications, in addition to PICS-reporting guidelines and theses. It should also be noted that authors of this review paper have remained independent from all published articles and PICS project reports stemming from the individual research teams.

Given these caveats, the results must be viewed with caution, and as an initial interpretive and somewhat qualitative sweep of both positive and negative outcomes from a diverse suite of social mobilization experiments. Many of these limitations stem from the realities and constraints of a research experimentation program aimed at testing a range of novel interventions in and with real-world communities struggling to address the climate change challenge. The complexity of such evaluations may partly explain the lack of synthesis documents from many other research programs. However, we believe the review is worthy of consideration in planning future evaluation studies of social mobilization projects at the very least.

## 5. Discussion and conclusion

The overarching goals of social mobilization in the face of climate change are multiple and ambitious, from scaling up personal behaviour change, to normalizing sustainability into social practices and norms, and building capacity and support for important policy changes. Our review of a selection of social mobilization efforts in the province of

British Columbia demonstrate both the challenges with implementing such programs, as well as their important potential for catalyzing and accelerating change towards low-energy, low-carbon, resilient societies.

Together, the broad pattern of results from the eight projects clearly suggests the value of including bottom-up, collective and coordinated multi-partner action alongside more familiar pathways to community planning and social change, to foster support for climate action. While there can be considerable challenges in scaling up smaller, place-based collaborative projects enabled in part by digital and visual media, these programs and methods may hold valuable and transferable lessons, including the important opportunity to link more common emissions reductions policies (e.g. incentive programs) with small-scale but effective grassroots efforts.

This evaluation of different BC research projects and community interventions on energy and climate change highlights the significance of key characteristics of effective social mobilization. Some of these have been widely reported, such as the importance of partnerships and collaborations (e.g. [76,15,23]), and the need to identify multiple benefits and co-benefits that appeal to funders, decision-makers and diverse participants (e.g. [13]). However, the following points suggest characteristics and techniques that perhaps should be more widely considered when designing and implementing social mobilization projects:

- **Close spatial proximity and locational identity** of the audience of interest offer a potentially powerful way to leverage social cohesion and visible action, consistent with findings from other studies on peer effects [15] and the diffusion of solar technology in California suburbs [77]. This turns the spotlight on smaller scales and micro-neighbourhoods as an under-studied and under-utilized opportunity for better uptake (see [78]), but elevates the concurrent importance of finding better ways of scaling up.
- The study supports the importance of linking energy and climate projects to **relevant concerns and themes** identified by participants (as in [19]), but notably on issues such as their quality of life, sense of place, and other social interactions and motivations in addition to comfort and cleanliness [75].
- The successful outcomes observed in some of the BC cases can be partly attributed to the use of a combination of **social media techniques, compelling visual learning tools, and social activities** such as parties, interactive or game techniques, and competitions [79]. If activities and imagery are made sufficiently entertaining, they have the potential to engage members of the public who might not otherwise be motivated to participate, engaging participants in gameplay can be more persuasive than the accompanying information conveyed through these processes [80].
- **Visual media** that make energy and climate change more visible have perhaps been under-utilized as a way to add value to community-based mobilization efforts and participatory planning. Techniques such as thermal imaging to stimulate retrofits have demonstrated significant reductions in GHG emissions in the UK, for example ([81]; see also [82]). Landscape visualizations in particular [57] can provide a vivid connection to salient community identities, emotional attachments and immediacy of future conditions, as called for by McAdam [21]. Other sectors such as advertising and the entertainment industry exploit these powerful tools very effectively.
- Two of the case studies highlight the strengths and weaknesses of **social media approaches**. Embedding government-led public engagement in a social media venue like Facebook offers a particularly promising opportunity for strengthening relationships between government interveners and intended recipients, if responsiveness and mediation to guide the discourse are consistently employed [67]. Given that over 50% of North Americans have a Facebook account [83], there is a clear opportunity to engage citizens in a format and online forum that is familiar and well-used.

The adoption of multiple pathways for engagement holds the potential to target different populations or interest groups, especially when coupled with the use of digital media. Such approaches can build momentum and interest in community engagement exercises, including the structured use of social media and more systematic but careful application of powerful visual media that are related to the community in question (see also [82]). Such action should furthermore be coordinated and conducted by multiple partners in both top-down, third-party, and bottom-up roles. There is a clear opportunity for local and regional government to upgrade their engagement and social mobilization methods and incentives by partnering with 'grassroots' community groups at neighbourhood or other scales to harness the potential of social norms, community leadership, and trust. Third-party interveners (e.g. NGOs, researchers, community groups) can play important roles in introducing new tools and stimulating community and government engagement processes to ultimately deliver richer and more effective engagement processes. Similarly, grassroots and third-party organizations should look to partner with government whenever possible to harness valuable resources, support and scaling potential. As recommended by Walker and Devine-Wright [25], there is a need for more sustained government funding of such third-party groups.

Of course, intergovernmental cooperation will also be crucial. A regional social mobilization strategy or framework that builds a level playing field, creates incentive programs, and provides support for local governments and NGOs in their implementation of climate strategies will be critical for leveraging current momentum and advancement on the climate file. The unique role of PICS in funding a sustained applied research program focused on social mobilization also raises interesting questions about whether such programs could be better structured to provide more definitive research findings across a topic, and could be scaled up as a form of intervention and experimentation in other geographies beyond BC.

In light of the urgency of trying to attain ambitious climate change and renewable energy targets, the study also raises questions on the sometimes limited or slower role of government policies and subsidies on their own in moving societies forward. It also suggests that the conventional view on social movements as a function of grievances and opposition [21,23] risks neglecting parallel opportunities for more collaborative and quietly spreading movements, especially in North America where political divisions can be stark. The study calls for more attention to cultures of volunteerism and co-management as seems more prevalent on energy and climate change issues in Europe [25,24,13]. There is also a clear need for more evaluation studies of social innovations and multiple social mobilization techniques (e.g. [82]) and meta-reviews (e.g. [79]).

Overall, this study suggests that effective social mobilization on climate change can be fostered in multiple ways: through applying community partnerships, various social and visual media techniques, and innovative social processes that can result in a range of outcomes, from improved dialogue and awareness to significant energy savings and carbon emission reductions. While the results of the BC projects reviewed here are encouraging, much work remains to be done to develop and test a variety of approaches in research, in practice, and in education of young people who will suffer the greater consequences of climate change. Meeting our climate change commitments requires us to mobilize our societies at an unprecedented pace and scale. This calls for much further innovation and experimentation, and more attention to scaling-up success stories, building on and beyond initial efforts such as those described here.

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